NEWS SCIENCE NEWS

VEDIC MATHEMATICS REDISCOVERED

Vedic Mathematics is the name given to the ancient system of mathematics which was rediscovered from the Vedas between 1911 and 1918 by Sri Bharati Krsna Tirthaji (1884–1960).

According to his research, all of mathematics is based on 16 *sutras*, or word formulas. For example, "Vertically and Crosswise" is one of these sutras. These formulas describe the way the mind naturally works, and are therefore a great help in directing the student to the appropriate method of solution.

Perhaps the most striking feature of the Vedic system is its coherence. Instead of being a hotchpotch of unrelated techniques, the whole system is beautifully interrelated and unified. The general multiplication method, for example, is easily reversed to allow one-line divisions, and the simple squaring method can be reversed to give one-line square roots. And these are all easily understood. This unifying quality is very satisfying; it makes mathematics easy and enjoyable and encourages innovation.

"Difficult" problems or huge sums can often be solved immediately by the Vedic method. These striking and beautiful methods are just a part of a complete system of mathematics which is far more systematic than the modern "system". Vedic mathematics manifests the coherent and unified structure of mathematics, and the methods are complementary, direct and easy.

The simplicity of Vedic mathematics means that calculations can be carried out mentally (though the methods can also be written down). There are many advantages in using a flexible, mental system. Pupils can invent their own methods; they are not limited to the one "correct" method. This leads to more creative, interested and intelligent students.

Interest in the Vedic system is growing in education, where mathematics teachers are looking for something better and finding that the Vedic system is the answer. Research is being carried out in many areas, including the effects on children of learning Vedic maths and the development of new, powerful but easy applications of the Vedic sutras in geometry, calculus, computing, etc.

But the real beauty and effectiveness of Vedic mathematics cannot be fully appreciated without actually practising the system. One can then see that it is perhaps the most refined and efficient mathematical system possible.

"On seeing this kind of work actually being performed by the little children, the doctors, professors and other 'big guns' of mathematics are wonderstruck and exclaim: 'Is this mathematics or magic?' And we invariably answer and say: 'It is both. It is magic until you understand it, and it is mathematics thereafter...'"

— Bharati Krsna Tithaji (1884–1960)
Rediscoverer of Vedic Mathematics

Research and Reconstruction

At the beginning of the 20th century, when there was a great interest in the Sanskrit texts in Europe, Bharati Krsna tells us some scholars ridiculed certain texts which were headed *Ganita Sutras*—which means mathematics. They could find no mathematics in the translation and dismissed the texts as rubbish.

However, Bharati Krsna, who was himself a scholar of Sanskrit, mathematics, history and philosophy, studied these texts and after lengthy and careful investigation was able to reconstruct the mathematics of the Vedas. According to his research, all of mathematics is based on 16 sutras, or word formulas.

Bharati Krsna wrote 16 volumes expounding the Vedic system, but these were unaccountably lost; so when the loss was confirmed in his final years, he wrote a single book, *Vedic Mathematics*. It was published in 1965, five years after his death, and is still available.

Rekindled Interest in Vedic Maths

A copy of the book was brought to London a few years later and some English mathematicians (Kenneth Williams, Andrew Nicholas, Jeremy Pickles) took an interest in it. They extended the introductory material given in Bharati Krsna's book and gave many courses and talks in London. A book (now out of print), *Introductory Lectures on Vedic Mathematics*, was published in 1981.

Between 1981 and 1987, Andrew Nicholas made four trips to India, initially to find out what else was known about Vedic mathematics. As a result of these journeys, scholars and teachers in India showed renewed interest. It seems that once they saw that some people in the West took Vedic maths seriously, they realised they had something special.

St James's School, then in Queensgate, London, and other schools began to teach the Vedic system, with notable success. Today, Vedic mathematics is taught widely in schools in India and a great deal of research is being done. Three further books appeared in 1984, the year of the centenary of the birth of Sri Bharati Krsna Tirthaji. These were published by The Vedic Mathematics Research Group.

The Cosmic Computer

When Maharishi Mahesh Yogi began to explain the significance and marvellous qualities of Vedic mathematics in 1988, Maharishi schools around the world began to teach it. At the school in Skelmersdale, Lancashire, UK, a full course, called "The Cosmic Computer", was trialled for 11–14-year-old pupils.

Maharishi said that the *sutras* of Vedic mathematics are the software for the cosmic computer which runs the entire Universe on every level and in every detail. *(Source: from the VedicMaths.Org web - site, http://vedicmaths.org)*

The Vedic Mathematics Sutras

This list of sutras is taken from the book *Vedic Mathematics*, which includes a full list of the 16 main sutras and 14 sub-sutras in Sanskrit, but in some cases a translation of the Sanskrit is not given in the text and comes from elsewhere.

Sutra	Translation
एकाधिकेन पूर्वेन	**By One More than the One Before**
निखिलं नवतश्चरमं दशतः	**All from 9 and the Last from 10**
ळर्ध्वतिर्यग्भ्यामं	**Vertically and Cross-wise**
परावर्त्य योजयेत्	**Transpose and Apply**
शून्यं साम्यसमुच्चये	**If the *Samuccaya* is the Same, it is Zero**
आनुरूप्ये शून्यं अन्यत्	**If One is in Ratio, the Other is Zero**
संकलन व्यवकलनाभ्यां	**By Addition and by Subtraction**
पूरणापूरणाभ्यां	**By the Completion or Non-completion**
चलनकलनाभ्याम्	**Differential Calculus**
यावदूनं	**By the Deficiency**
व्यष्टिसमष्टिः	**Specific and General**
शेषाण्यङेन चरमेण	**The Remainders by the Last Digit**
सोपान्त्यदयमन्त्यं	**The Ultimate and Twice the Penultimate**
एकन्यूनेन पूर्वन	**By One Less than the One Before**
गुणितसमुच्चयः	**The Product of the Sum**
गुणकसमुच्चयः	**All the Multipliers**

Watching a child go through our education system is like watching reverse metamorphosis: in flies a beautiful butterfly; out crawls a caterpillar.

(from *If You Want To Be Rich And Happy, Don't Go To School*, by Robert Kiyosaki, 1992)

THE MAGIC OF VEDIC MATHEMATICS

by Jain © 2003

The gift that the Hindus gave to world, thousands of years ago, and which is currently employed in our global silicon chip technology, was none other than *the invention of zero and the use of the decimal point*. We call our common numbers "Arabic numerals" but, really, they extend back to the Hindu concept of creation and void known as *Bindu* or "the Zero Point". All Vedic mathematics is based upon the understanding of Unity consciousness, which means the utilisation of number bases that correspond to:

0, 10, 100, 1,000, 10,000, etc., all of which add to 1.

There are 16 *sutras*, or simple Sanskrit word formulas, which solve all known mathematical problems in the branches of arithmetic, algebra, geometry and calculus. They are easy to understand, easy to apply and easy to remember.

This Vedic one-line mental arithmetic is very helpful in stimulating modern mathematicians to adopt it for its simplicity and speed. Once initiated into these Vedic rules, students of all ages tend to appreciate and enjoy the enhancement of mathematics.

Vedic mathematics is a previously long-hidden treasure trove of intelligent mathematical knowledge, and it should be within easy reach of everyone who wishes to obtain it and benefit by it.

Vedic mathematics is a total system. The Vedic mathematician was also an astronomer, an engineer, a musician, a healer and a poet. The temple builder had no pen and paper; he simply calculated in his head.

So, you are out in the field and you need to tile a floor that is, say 98 units square. How do you do it with such mental ease? Let's look at some practical examples.

The Squaring of Numbers Near a Base

To solve 98 squared (98 x 98, or 98^2), we must first determine what base we are in. It is close to 100, therefore we say Base 100. We must now choose one of the 16 major *sutras* to solve the problem. The one to use here is called **"By the Deficiency—by whatever the deficiency, lessen it further by that much and set up the square thereof"**. Sounds cryptic and meaningless, yet it quickly solves the problem.

We get our answer by merely knowing how much is 100 less 98. Knowing that the deficiency is 2, we merely lessen 98 by 2 and then we tag on the squaring of that 2. As a one-line answer, the setting out would appear as thus:

98 squared = 98 – 2 / 2 x 2
Simplifying it: = 96 / _ 4

We almost have our answer. What we need to know is that since our base is 100, it has two zeroes; therefore, this fact governs the need for two spaces for two zeroes or digits after the "forward slash" symbol (/). By inserting or inventing the zero as a "place marker", the answer is achieved:

98 squared = 96 / **0**4
= 9604

Observe similar examples:

97 squared = 97 – 3 / 3 x 3
= 94 / 09
= 9409

96 squared = 96 – 4 / 4 x 4
= 92 / 16
= 9216

When the number being squared is above the base—of 100, here—we add the excess and square the excess:

104 x 104 = 104 + 4 / 4 x 4 = 108 / 16 = 10,816
104 x 105 = 104 + 5 / 4 x 5 = 109 / 20 = 10,920

What if we enlarged our numbers to 998 squared? It is close to 1,000, so we say Base 1,000 and know to have three spaces (for zeroes or digits) on the right hand side of the (/).

998 squared = 998 – 2 / 2 x 2
= 996 / _ _ 4
= 996 / 004
= 996,004

Understanding this, you can be calculating digits in the millions:

9998 squared = 9998 – 2 / 2 x 2
= 9996 / _ _ _ 4

Since we are in Base 10,000, the four zeroes determine the need for four spaces (zeroes or digits) after the (/).

= 9996 / 0004
= 99,960,004

There is a worldwide debate currently raging about the efficacy of Vedic mathematics versus the crumbling foundations of Western mathematics. Generally speaking, the theorems we all learned at school are not wrong, but clumsy. Some of the Western geometrical formulas are certainly inadequate. For example, the formulas for sphere packing in the higher dimensions increase up to the sixth dimension, then suddenly decrease for higher dimensions, which is simply absurd.

Unfortunately, some diehard senior mathematicians, in an attempt to protect the crumbling foundations that they now stand on, feel threatened by the lightning-quick mental calculations of Vedic mathematicians and go to great lengths to deride Vedic maths as a "bag of tricks".

The Squaring of Numbers Ending in Five

Here is another example illustrating the Vedic mathematical system's utter simplicity in demonstrating "the path of least resistance". If we wanted to square the number 25, i.e., 25 x 25, we would conventionally take three lines of working out. Vedic mathematics merely looks at the question, applies one of the 16 sutras, and solves it mentally in one line. In this case, the sutra at work is "**By One More than the One Before**", that is, the previous digit.

We observe that 25 is a two-digit number and 5 is the last digit, but we are mainly interested in "the previous digit", which is 2. We say, mentally, "What is one more than two? It is three." The word "By" in the sutra really means "to multiply". The setting out for the first half of the answer is thus:

25 squared = 2 "by" 3 / ....
= 2 x 3 / ....

To this we tag on the last digit "5" squared:

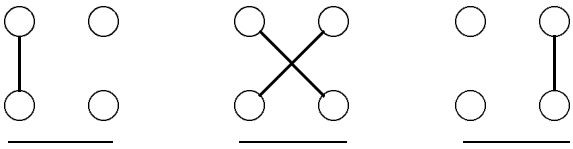
= 2 x 3 / 5 x 5
= 6 / 25
= 625

Similarly, all other numbers that end in 5, when squared, can be calculated instantly:

15 squared = 1 x 2 / 5 x 5 = 2 / 25 = 225
35 squared = 3 x 4 / 5 x 5 = 12 / 25 = 1,225
45 squared = 4 x 5 / 5 x 5 = 20 / 25 = 2,025
95 squared = 9 x 10 / 5 x 5 = 90 / 25 = 9,025

Sutra: "Vertically and Crosswise"

Here is another simple sutra, the one that Bharati Krsna Tirthaji refers to as most widely used, called **"Vertically and Crosswise"**. It solves all multiplication by application of a pattern, which is registered by the right brain as feminine-natured mathematics (in contrast to the logical, male, left-brain style of mathematics generally taught at school).



This sutra shows we will have a three-digit answer, represented by the three short horizontal lines.

Here is how we traditionally write the setting out for "26 x 31":

26
x 31

Notice there are four digits involved. Let each digit be represented by a small circle or dot, according to the format shown in the diagram above. This will help you understand "cross-addition", which is shown as the middle part [(2 x 1) + (6 x 3)] and uses both multiplication and addition in the form of the letter "X", corresponding with the crossover of the optical nerve in the brain. (Below, the small letter "x" stands for multiplication.)

= 2 x 3 (2 x 1) + (6 x 3) 6 x 1
= 6 20 6 ("2" is carried over)
= 8 0 6
= 806

Sutra: Digital Sums for Multiplication by Eleven

When computer users need to move large volumes of electronic data efficiently, the solution employed is invariably compression. **"Digital Compression"** (or **"If the Samuccaya is the Same, it is Zero"**) is a powerful sutra that solves multiplication by 11 very quickly. If we want to multiply 25 by 11, we merely add the two digits of the 25 and say "2 + 5", which equals 7, and insert that digit between the other two digits. Thus the answer is 275.

Another way of showing this is to separate the two digits and insert their digital sum:

25 x 11 = 2 (2 + 5) 5
= 2 7 5
= 275

In this example, the "1" of the "12" gets carried over to the left

39 x 11 = 2 (3 + 9) 9
= 2 12 9
= 329

VEDIC NUMERICAL CODIFIED KNOWLEDGE
How the ancient seers sang the long decimal form of Pi

In ancient India, they would sing songs to memorise long decimals. The Brahmans or scholarly caste, secretive of their knowledge, sonically encrypted mathematical formulas into their devotional praises or hymns to Lord Sri Krishna and also recorded historical data in codified lyrics.

The system has similarities with numerology, where values of numbers are ascribed to consonants (as in A = 1, B = 2, C = 3, D = 4), but the Vedic numerical code was so sophisticated in Sanskrit that it possessed three layers and therefore triple meanings.

It turns out that the decimal form of the transcendental number,

Pi = 3.14159265358979323846264338327 92…,

was hidden or codified in the syllables in the following chant:

Gopi Bhagyamaduv rata
Shringishodadi Sandiga
Kala Jeevitarava Tava
Galaddhalara Sangara

The top line, *go* = 3, *pi* = 1, *bha* = 4, *ya* = 1, *ma* = 5, *dhu* = 9, *ra* = 2, *ta* = 6, etc., gives the first eight figures of *pi* (π), the ratio of the circumference of a circle to its diameter.

Not only did the code give *pi* to 32 decimal places, but there was a secret Master Key within the patterning of the 32 that could unlock the next 32 decimals of *pi*, and so on—a ticket to infinity!

The code not only praised Krishna, it operated on another level as a dedication to Shankara. (Around AD 800, Shankara was a celebrated *acharya*, or teacher, who founded four monastic orders. He could read at the age of two and had mastered the Vedas by the time he was eight. He wrote scholarly commentaries on *The Bhagavad-Gita* and Upanishads, which led to the decline of Buddhism in India. He is considered a partial incarnation of the avatar Shiva.)

An Ancient System for the Modern Age

In conclusion, I believe the time has come for all secret knowledge of the past to be kept secret no longer. It is time for the ancient seers' infallible mental and one-line system of Vedic Mathematics to be reintroduced. ∞

About the Author:

Jain is the author of nine self-published books on Sacred Geometry, which he has actively been researching and teaching for over 20 years. Topics include: Magic Squares and their Atomic Artforms; the Vedic Square and its Digital Sums; the *Phi* Proportion or the Living Mathematics of Nature; the Five Platonic Solids and the 13 Archimedean Solids; and Vedic Mathematics

As an authorised school performer in a travelling show called "Mathemagics", Jain has taught thousands of children and adults in Australia the wonder of the pure mathematical principles relating to Atomic Art and discovery. He is currently writing a series of four books covering the Vedic Mathematics Curriculum for the Global School.

If you would like a copy of Bharati Krsna Tirthaji's only book, *Vedic Mathematics*, or the video, *Vedic Mathematics for the New Millennium – Part 1: The Magic of Nine* (see reviews this issue), contact: Jain, 777 Left Bank Road, Mullumbimby Creek NSW 2482, Australia, telephone +61 (0)2 6684 4409, email jain42@byrononline.net.